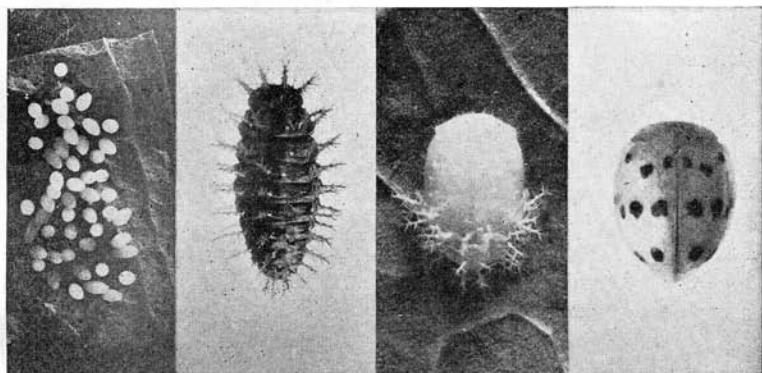




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Eggs

Larva

Pupa

Adult

THE MEXICAN BEAN BEETLE A NEW AND SERIOUS PEST IN TENNESSEE

By G. M. BENTLEY



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Knoxville, Tenn.
June, 1922





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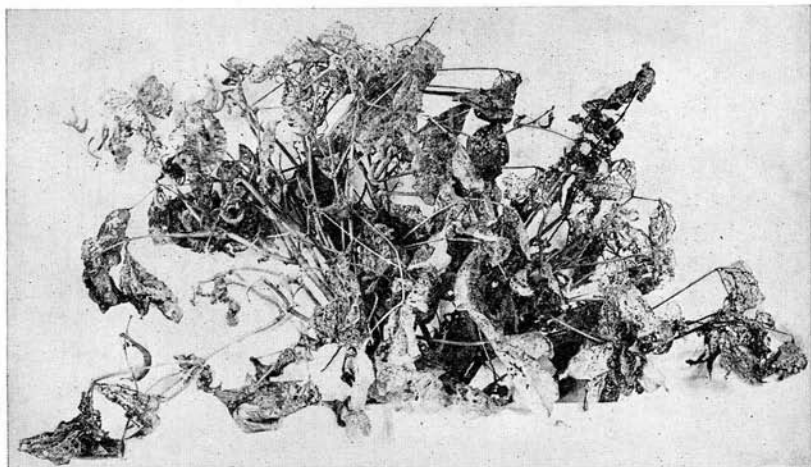
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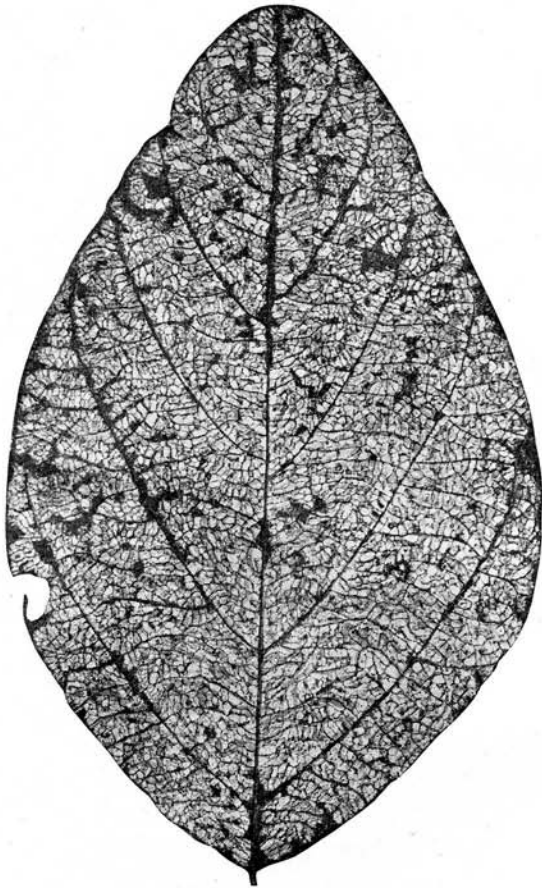
The Mexican Bean Beetle a New and Serious Pest in Tennessee

By G. M. Bentley

Chief among the insect pests in Tennessee at present is the Mexican bean beetle (*Epilachna corrupta* Muls.) Letters with specimens daily are coming to the Office of the State Entomologist concerning this new and serious pest. If you have not done so, acquaint yourself with this most destructive pest and realize that heavy losses have already been made and probably greater devastation awaits the home garden, the trucking and agricultural interests of the State from the inquiry of this insect than any yet established. It is a matter of considerable alarm and every one should learn to recognize the beetle in its different stages and how best to control it. From the standpoint of agriculture this bean pest may be even more serious than the boll weevil has been to cotton. The latter affects only one crop, whereas the bean lady-bird beetle destroys the most essential crops of the South as peas and beans



Bush bean plant destroyed by the Mexican bean beetle.

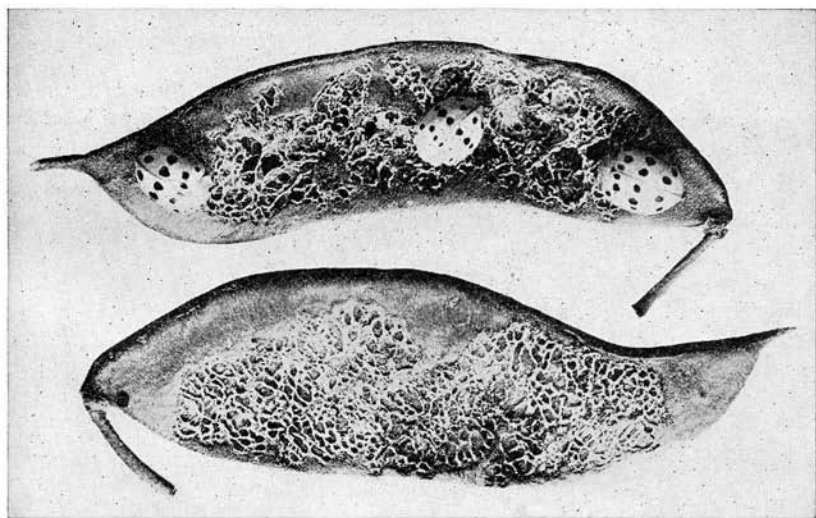


Characteristic injury of larvae on leaf.

are grown for human food, for stock food, as forage and are very necessary for soil improvement and the conservation of soil fertility.

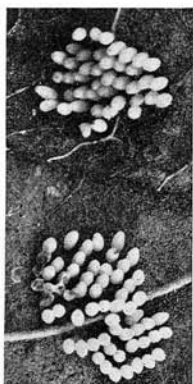
Easy to Recognize—The presence can best be determined by examining the leaves of garden beans. To find these with leaves eaten in irregular patches with thin upper tissue of leaf entirely or partly covering these eaten areas of the leaf; finding bean leaves thus injured look beneath these leaves. More than likely you will find some stage of the bean beetle. To find the leaves yellow and dry with practically all of the

body of leaf eaten, the fine net work of leaf alone remaining indicates a heavy infestation. Finding yellow or copper colored lady-bird-like beetles about $\frac{1}{4}$ inch in length with 16 small dark dots upon their backs, you may feel reasonably sure that they are the adults of the Mexican bean beetle. To find bright yellow, soft and spiny bodied insects from $\frac{1}{8}$ to $\frac{3}{8}$ inch in length feeding on the under surfaces of bean leaves is almost positive assurance of the presence of the young beetles. Immediately report your finding and send in a tight tin box some specimens to your State Entomologist, University of Tennessee, Knoxville, Tennessee.



Work of Mexican bean beetle on bean pods.

Habits—The pest breeds rapidly and feeds voraciously. In 3 to 6 days it may ruin an entire crop. Its life history in the West confirmed by observations in Tennessee indicates that 3 to 4 weeks are required for its development from egg to adult. It passes the winter hidden away beneath rubbish, trash, leaves, stems, etc., in the adult stage to become active in March if food plants can be found.



Average sized egg masses on underside bean leaf.

Egg—In masses having from 5 to 60 eggs on the under surfaces of host plants or nearby growths the light yellow eggs are placed. Usually these masses contain from 40 to 60 eggs placed on ends. One female may lay as many as 1669. In midsummer the eggs hatch in 5 or 6 days. In infested fields in midsummer it is common to find all stages of the insect.

Larva—The larva passes through 4 stages or instars in its development and requires in early spring 50 or more days for completion. Later in the season a much less time is required. It feeds ravenously and grows rapidly reaching its full growth in about 2 weeks. It feeds on under surfaces of leaves and its injury to leaf is distinguished from that of the adult



First, second, third and fourth larval stages of Mexican bean beetle.

feeding by the almost entire thin upper membrane of the leaf. In the case of an adult injury this thin upper membrane is eaten through in places. When full grown the larva measures from $\frac{1}{4}$ to $\frac{3}{8}$ of an inch long.

Pupa—After growth is attained the larva or grub seeks some sheltering leaf of host plant or nearby growths. The rear end of body is firmly attached to a leaf where it changes

to a pupa and remains until the adult emerges. From the time the pupal covering splits the bean beetle is full grown and free in 4 or 5 days.



Full grown
larva



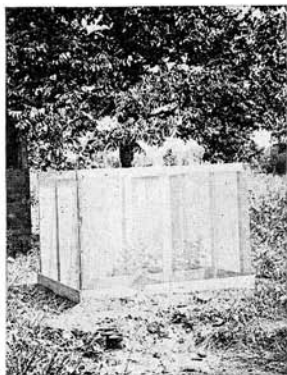
Pupa



Adult

Adult—The adult when first emerged is of a very light yellow color and extremely soft. The spots do not appear until after a few hours. When the beetle becomes hard the color changes to a deeper yellow and finally to a copper or bronze color with the 16 spots plainly seen. There are 8 spots on each wing cover. These spots vary considerably in size and outline, very rarely two or more spots fusing together. Newly hatched adults begin laying eggs in about 10 days. The entire life cycle of the Mexican bean beetle from egg to adult requires 3 or 4 weeks in summer season, reproduction taking place from blooming period to the killing of host plants by frost.

How Spread—The adult Mexican bean beetles are strong fliers and by this means chiefly they are supposed to infest new areas. The eggs, young and pupae may be conveyed on fresh or dried host plants or in the case of pupae and eggs they may be scattered in shipped growths taken near infested host plants. The bean beetle seems to prefer the higher sections of the State although by no means do we find them restricted alone to such sections. Last year, 1921, heavy infestations were found at Signal and Lookout Mountains, and in many sections of highland rim in Cumberland Mountains. The amount of this infestation indicates that some must have been present at least a year previous.

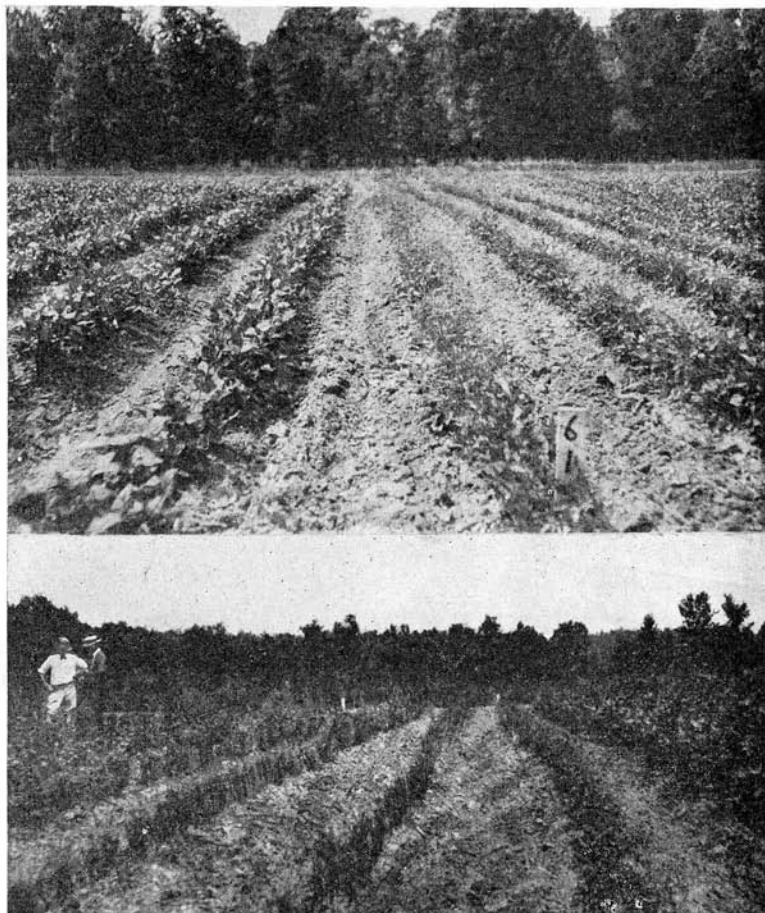


Wire cage used for overwintering Mexican bean beetles on Lookout mountain near Chattanooga,

Insect life zones depend primarily upon altitude, latitude, temperature and rainfall conditions. The Mexican bean beetle already ranges from 8,000 feet altitude and 41 degrees latitude in northern Colorado to 100 feet altitude and 31 degrees latitude in south Georgia. Temperature range is from 30 to 35 degrees below zero to 110 degrees F. Rainfall range is from approximately 20 inches annually to over 60 inches annually.

It is supposed to be a native of Mexico or Central America and has been known for some 50 years. It was first established in the United States in the arid sections of the West—perhaps Colorado. From thence conveyed on alfalfa hay to Birmingham, Alabama, possibly in 1918 but certainly in 1919. In the summer of 1920 reports of the beetle were sent to Alabama Entomologist. In the spring of 1921 it was first discovered in Chattanooga section of Tennessee. On June 2 specimens were found 11 miles north of Chattanooga and by November it was located in 32 counties of Tennessee. A very careful study of the dissemination of this pest in Tennessee was conducted by the United States Bureau of Entomology in cooperation with the Tennessee State Board of Entomology.

The Mexican bean beetle now occurs in Colorado, Arizona, New Mexico, Texas, Alabama 35 counties, Georgia 36 counties, Tennessee 37 counties, Kentucky 2 counties, North Carolina 2 counties, South Carolina 3 counties.



Experimental plots showing effects of different insecticides to control Mexican bean beetle.

For photographs from which cuts in this bulletin were made appreciation is due Neale F. Howard, U. S. Bureau of Entomology. For courtesies shown writer while inspecting the experimental plots at Birmingham, Alabama showing results of investigation with various insecticides this spring many thanks are due Messrs. J. E. Graf and Neale F. Howard, Bureau of Entomology.

Since 1921 the spread has continued and today it occurs in many new sections. Almost daily new areas are being ad-

ded. At this time, August 16, 1922, 37 counties in Tennessee are known to have well established colonies. To complete the study of the limits reached by the beetle in Tennessee you can render much assistance by sending to the writer in a tight tin box specimens taken from any section in the State.



Shaded Counties show present spread of Mexican bean beetle in Tennessee.

Infested Counties—The following Tennessee Counties in part or in whole at this date, August 16, 1922, have the Mexican bean beetle present and doing injury: Hamilton, Bradley, Polk, McMinn, Monroe, Marion, Sequatchie, Bledsoe, Rhea, Meigs, Loudon, Blount, Knox, Roane, Jefferson, Hamblen, Grainger, Cumberland, Morgan, Anderson, Campbell, Scott, Franklin, Lincoln, Coffee, Grundy, Warren, Van Buren, White, DeKalb, Cannon, Putnam, Fentress, Overton, Bedford, Moore, Sevier.

Host Plants—Among the food plants of the Mexican bean beetle are found all varieties of bush and pole table beans, shell beans, snap beans, lima or butter beans, pinto beans, navy beans (phaseolus).

- Beggar weed (*Meibomia*)
- Cowpea (*Vigna*)
- Hyacinth bean (*Dolichos*)
- Soy bean (*Glycine*)
- Aduski bean (*Phaseolus angulatus*)
- Sweet clover (*Melilotus*)
- Alfalfa (*Medicago*)

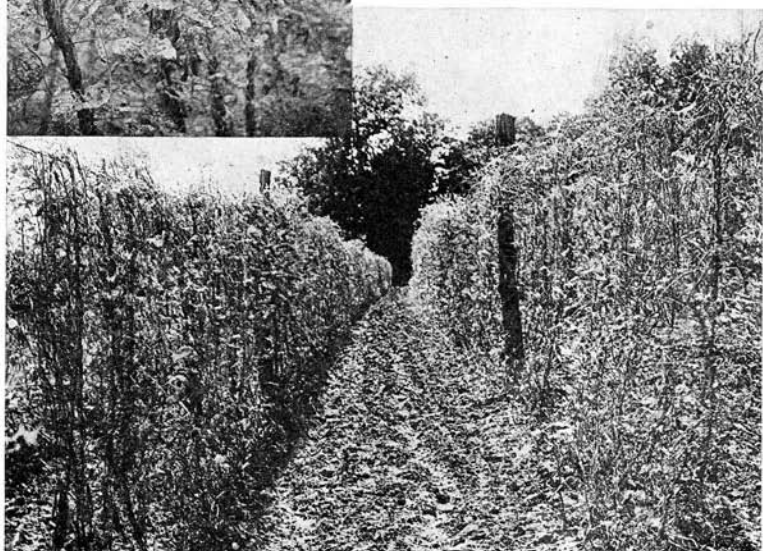
“The adult or beetle will feed on a large number of plants, representing widely separated botanical families in the absence of its more preferred hosts, including the following: Velvet bean, Kudzu, corn, grasses, okra, egg plant, squash and others. The various varieties of garden beans, lima beans, pinto and navy beans are undoubtedly the favorite hosts. Next in favor with this beetle is probably the beggar weed.” For the above

list of host plants credit is due Neale F. Howard who has made this a special study.

Destructiveness—In Alabama according to Dr. W. E. Hinds, Entomologist, in 1920 and 1921 snap beans and shell beans were destroyed 80 percent; lima beans 65 percent; California black-eyed peas 25 percent; field cowpeas and soy beans 5 to 10 percent. Navy beans and other dried beans including lima beans also snap beans produced both commercially and in home gardens may be practically exterminated by this insect.



Pole Lima beans destroyed by
Mexican bean beetle.



True economy demands that investigational work now under way by Bureau of Entomology should be not only continued but rather extended with present trained staff available to include the full range of geographical and climatic conditions where species now occur.

This problem promises ultimately to become even more serious in effect than the Gipsy moth, Hessian fly, European corn-borer or Mexican cotton boll weevil.

All sections of United States are concerned because of the importance of these legume food plants for human food, animal forage and renewal of soil fertility.

Statements Made by Tennessee County Correspondents

Bradley County: "The Mexican bean beetle is the worst new pest we have. Pretty well all over the County in the gardens and has done considerable damage."

Hamilton County: "The bean beetles have been very bad on the garden beans and are found in at least 75% of the gardens and in most of the corn field beans. Also one man reported them working on his strawberry plants to a damaging degree."

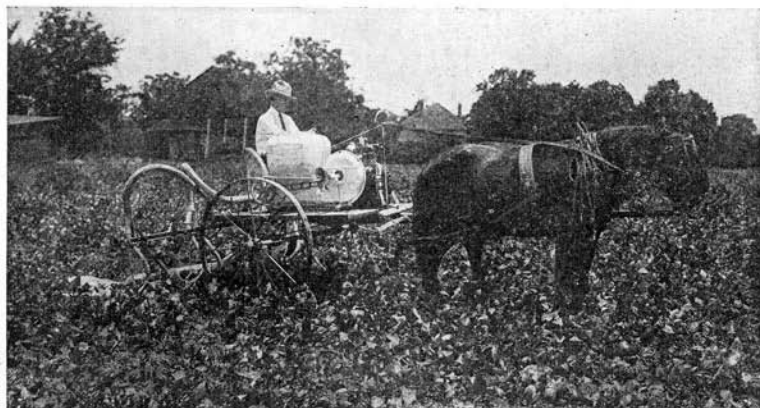
Roane County: "The Mexican bean beetle covers the County like a blanket destroying the beans all over the County. It also feeds on cantaloupes and pumpkins. It is worse than San Jose scale on the orchards."

Cumberland County: "Mexican beetle generally in this County. Does not yet bother soy beans."

Anderson County: "I find the Mexican bean beetle has come into sections of this County. How widely distributed I do not know. I find some of them four miles north of Andersonville on Clinch River. Not numerous enough yet to do serious damage but threatening."

Hamilton County: "The Mexican bean beetle is spreading very fast. It can be seen in almost all truck patches and home gardens when a year ago it was hardly noticeable. I notice some of its work on the soy bean. Don't notice much of it on the field pea, in fact have not seen any field peas affected."

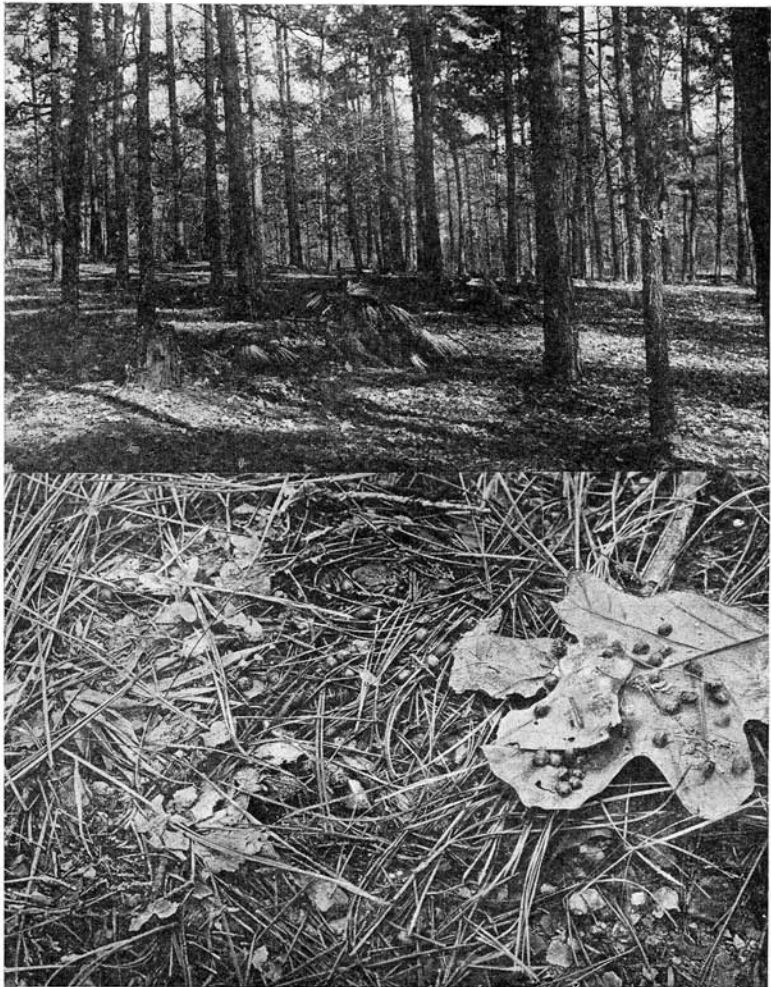
Rhea County: "The bean beetle is very destructive in some sections of the County. I have not found any of them on my farm so far."



Top—A four row power duster for bush beans.
Bottom—Bellows type knapsack dusters in operation.
Four and five dustings should be given to a crop.

Bradley County: "You asked about the bean beetle. We sure have it here. I have not heard of but one family in my section not having it. Taking the corn field beans and to a small extent on soy beans. Practically all gardens in this community are ruined."

Van Buren County: "The Mexican bean beetle has done a great deal of damage in this County this year, not only to bunch and stick beans but to soy beans and other field beans. Last year there were a few gardens damaged. This year many were totally ruined so far as beans are concerned. We would appreciate any suggestions."



Top—View of woods where Mexican bean beetles were found passing the winter.

Bottom—Pine branch in above picture removed showing adult beetles in leaves and needles beneath.

Fentress County: "There is nothing unusual here at the present time in regard to insects except the Mexican bean beetle. It has done very much damage to garden beans. Some people gave up in despair, others used hand picking and

a few are trying different remedies. I hope somebody will find a remedy. I did not hear of any complaint that the beetle damaged soy beans but this may come yet."

Control

Hand Picking—Keep watch of bean plants finding a few bean beetles present destroy by hand picking the insects or brushing them.

Dusting—Finding several plants infested they should be treated by thorough dusting of **under surfaces** of host plants with 1 part of calcium arsenate and 9 parts of hydrated lime thoroughly mixed, or calcium arsenate 1 part, sulphur 1 part and hydrated lime 4 parts. **Never use acid or ordinary lead arsenate or Paris Green.** The bean foliage is very susceptible to arsenical injury. Where the infestation is serious only bush varieties of beans should be planted as they can be dusted easier and they mature sooner. Where the infestation is light, however, pole beans can be successfully grown with a little care. There are several types of dusters on the market adopted to different conditions. For gardens or small acreages a hand duster is practical. Treated snap beans should be carefully washed before cooking. **A dependable and practical liquid spray at present is not known, since basic lead arsenate and magnesium arsenate are not commonly available.**

Disposal of Crop Remnants—All remains of early and late beans should be plowed under as soon as crop is off. Leave no trash under which adults may pass the winter.

Conclusion

Look for the bean beetle and finding it act at once to control it. It is a matter of great importance especially to the inhabitants of those states where the pest occurs, Colorado, Arizona, New Mexico, Texas, Alabama, Tennessee, Georgia, Kentucky, North and South Carolina. Its ability to spread rapidly and to completely destroy essential crops, also considering the fact that the host plants of this insect are generally grown and are of great importance for food and soil fertility and also that the insect will survive a temperature of 35 degrees below zero—thus making it possible for it to live almost anywhere it might become established in the United States, makes the Mexican bean beetle today one of the outstanding and greatest pests to agriculture.